Course Syllabus
Physics 221: Intermediate Laboratory
Fall Semester, 2020

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WWW:	**http://sahyun.net/courses/physcs221/index.htm**
CANVAS:	**http://www.uww.edu/CANVAS**
Class Meetings:	M W F 10:00 – 11:45 a.m. in UH50.
Office Hours:	M W F 12:00 noon - 1:00 p.m.; R 10:00 – 12:00 noon or by appointment. Preferred meetings are by WebEx @ https://uww.webex.com/meet/sahyuns but face-to-face meetings can be arranged.
Text:	Schultz *Grob's Basic Electronics*
Pre-requisite:	PHYSCS 181 or PHYSCS 141 AND MATH 254

Other required materials: You are expected to bring paper, a scientific calculator (one with trigonometric and logarithmic functions, scientific notation, etc; these are available for **less than** $20), a quadrille-ruled **bound lab book** (available in the bookstore, no spiral notebooks!), and a data storage device (USB).

Email Policy: Please use your **UWW email** address for email communication. Other personal emails will be ignored. I usually respond emails within one business day. Please do not expect me to respond on weekends or holidays. It is your responsibility to check your UWW email and Canvas account on a daily basis to hear about course announcements.

Course Objectives and Description: This is a laboratory course concentrating on techniques of recording, interpretation of, and reporting experimental data. The labs will cover hands-on use of various instrumentation (multimeters, waveform generators, power supplies, breadboard, basic circuit components). Topics will cover hands-on instrument use, data acquisition, error analysis, numerical analysis, graphing techniques, computational tools and report writing.

Required materials:

1. ***Scientific calculator***: Graphing capability is not necessary. This is the type of calculator you will need to use during the exam. No cell phones! Please bring it to class and to the labs.

2. ***Textbook***: Grob's Basic Electronics by Schultz. ISBN 0073373877, Publisher McGraw-Hill.
Edition 12. Available as textbook rental at our bookstore.

3. ***Notebook***: Please make sure to bring paper/pencil to work out problems in class and to take notes in lab, as well as keeping any additional notes besides the ones handed out to you. I usually require and ask you to bring your notebooks to my office hours to check your progress. You have to keep a notebook to show your work!

4. ***Personal or Department Computer***: Since class requires extensive data analysis and report writing, you will need your personal computer (laptop). Sometimes you will need to bring it to the lab for data acquisition. We will have a few HW questions assigned using MATLAB. MATLAB is installed in our department computers and available via Citrix. We will also be using Excel for certain quick analysis of data.

Labs: There will be a lab each week with a set of measurements to make and questions to answer. No lab make-ups! Labs will run in Upham 53. I might change the order and the topic of the labs according to the level of the class. Not all lab material listed on the material is to be covered. Some material will be covered earlier in the class whereas some material will be left to be covered in the lab only through experiments.

The tentative course & lab schedule is subject to change.

		PHYSCS 221 Tentative Schedule	Fall 2020		
Week	**Date**	**Topics**	**Chapters**	**Labs**	**Homework Due**
1	9/3	Introduction. Lab Safety, Lab report writing. Scientific notation. Measurements and Uncertainties. MATLAB & GNU Octave	I, 1	Lab 1 – Lab safety, Introduction and MATLAB	
2	9/10	Multimeters, Resistors, potentiometers, short and open circuit concepts	2, 8	Lab 2 – Power supplies, multimeters (analog and digital), resistors, Clips, connectors, cables.	Lab Safety Quiz, MATLAB sample calculation.
3	9/17	Ohm's Law, Series and parallel circuits	3, 4, 5, 6	Lab 3 – Understanding protoboard. Soldering workshop - Resistor cubes and measuring R	Reading Resistors Quiz
4	9/24	Signals, wave patterns and measuring	XYZ Oscope	Lab 4 – Function Generators and Oscilloscopes (analog and digital)	Resistor Cube Calculation
5	10/1	Capacitors and Inductors	16, 19	Lab 5 – Measuring C and L	Guide for using an oscilloscope
6	10/8	RC and L/R Time constants, Digital waveforms and data acquisition	22	Lab 6 –Data acquisition (oscilloscope), RC / RL circuits	Capacitor and Inductor Quiz
7	10/15	Indroduction to Arduino	Arduino guide	Lab 7 –Introduction to Arduino	RC time constant calculation.
8	10/22	Arduino Input and Output	Arduino guide	Lab 8 - Generating signals with Arduino, receiving input	Arduino working code.
9	10/29	Analysis of digital signals		Lab 9 - Analyzing Arduino's output, A to D conversion.	Arduino signal code.
10	11/5	Arduino and MATLAB/Octave		Lab 10 - Interfacing Arduino with MATLAB or Octave	Analysis of digital output.
11	11/12	Physics Project with Arduino		Lab 11 - Physics project research ideas and begin.	MATLAB or Octave code and data showing interfacing with Arduino.
12	11/19	AC Circuits and Filters	23, 26	Lab 11 - Work on Project	Project Statement
	11/26	Thanksgiving Break			
13	12/3	Diodes and Transistors	27, 28	Lab 11 - Work on Project	
14	12/10	Present Projects			Project Report
15	12/15	Final Exam, on Tuesday Dec. 15th, 2:30 – 4:30 pm			**Final Exam** (Cumulative)

Grading policy: The grade you earn in this class will be based upon the assignment types listed in the table on the next page. The maximum you can get is 100% (not counting extra credit). A grading scale is given below for your reference. You can use the score below to determine your guaranteed grade. Grades are not curved, encouraging you to work together, but I expect each student to hand in their own work. There will be occasional opportunities for extra credit. Thus, a perfect score in this class can exceed 100%. I will be posting your grades on Canvas.

Final exam (cumulative): On Tuesday Dec. 15th, 2:30 – 4:30 pm. If you have more than two comprehensive final exams on that day, please let me know now, so we can arrange ahead of time.

The university final exam policy: *"All comprehensive final examinations shall be administered at the prescribed time during the final examination period. For those classes where there is no final examination, the time prescribed during the final examination period shall be used as a regular class meeting. Exceptions to meeting classes during the examination period requires specific written approval in advance from the college dean. No student shall be required to take more than two comprehensive final examinations on the same day. "*

Homework: There will be homework assignments from material covered in labs, lectures and reading assignments. Homework assignments will be due on various days, depending on the week. Please keep track of this with the accompanying schedule and based on the pace of our lectures. You should consider the homework the minimum number of problems needed to understand the material. It is essential that you work on the problems on your own first.

GRADING CRITERIA AND TENTATIVE DATES:

The **approximate** distribution and estimated number of points are:

Course component	Point value	%
Assignments	110*	35%
Laboratory Notebook	110*	35%
Project Report	40	12.5%
Final	40	12.5%
Class Participation	15	5%
Total points =	315 points	

* Lab grade component may be substantially different depending on what happens during the semester.

Course grades will be determined by the percentage of total points assigned for the course.

93% = A,	80% = B-,	67% = D+,
90% = A-,	77% = C+,	63% = D,
87% = B+,	73% = C,	60% = D-,
83% = B,	70% = C-,	< 60% = F.

Lab Reports: You will be turning in lab reports on chosen experiments. Report outline and rubric will be discussed in class. Each lab activity will require a brief report. Each lab and experiments will follow brief rubrics of what is required. The lab reports should present only your work (nothing copied from the internet) and should be typed. You can include images/sketches of your experiment, which is owned by you. One goal of the course is to prepare you to create lab reports with different format requirements. You will learn how to create a report following a lab activity not necessarily an experiment only.

Attendance: Definitely required! We will have in class activities, demos, and active learning sessions. Randomly collected attendance checks and unannounced quizzes will be a part of your grade. Some of these activities will reflect as your activity scores (in-class activities). Also it is a disadvantage to miss any lectures because the lectures, demonstrations, and in-class activities will greatly enhance your ability to understand the material. There will be assignments done in class that are worth points. If you miss any class/lab/exam, you need to provide a legal document to claim for missed credits. Just sitting in class may not earn you participation grades.
Please be prepared to work in a group of 2-3 people and for lab activities. These groups may be shuffled a couple of times throughout the semester.

Per university policy, University Health and Counseling Services cannot be expected to provide students with medical excuses for short-term absences from class or missed deadlines due to illness, injury, or a mental health appointment. In the event of a prolonged illness or injury and an absence of more than 3 days, UHCS frequently works with students to provide appropriate documentation and notifies pertinent instructors as well as the Dean of Students. Please see:

Student Policy: http://www.uww.edu/student-handbook/policies-absence

This policy reinforces the students' responsibility to communicate directly and proactively with faculty about conditions that interfere with their class attendance. We encourage students to speed their own recovery and to refrain from spreading infections such as colds and flu throughout the campus community by making mature decisions when they are too sick to attend class or go to work.

In order to stay consistent with the university policy, when a student presents to UHCS requesting a medical excuse, UHCS will do the following:

- Distribute the attached document explaining the policy
- Encourage the student to communicate early with their professors
- Work with those students that indeed have a medical reason for a prolonged absence and an established relationship with UHCS.

FERPA Policy: Information cannot be given out to third parties without the student's written consent.

Students with Disabilities: Please contact me in the first two weeks of semester if you have a documented requirement for accommodation to obtain equal access to this class or to any assignment I may give.

Recording Policy: Recording of class and other curricular activities is prohibited without the express permission of the instructor and notification to all students in the class.

Recordings, course materials, and lecture notes may not be exchanged or distributed for commercial purposes, for compensation, or for any other purpose other than study by students enrolled in the class without the written permission of the instructor. Public distribution of such materials may constitute copyright infringement in violation of federal or state law, or University policy.

The University of Wisconsin-Whitewater is dedicated to a safe, supportive and non-discriminatory learning environment. It is the responsibility of all undergraduate and graduate students to familiarize themselves with University policies regarding Special Accommodations, Misconduct, Religious Beliefs Accommodation, Discrimination and Absence for University Sponsored Events. (For details please refer to the Undergraduate and Graduate Timetables; the Rights and Responsibilities section of the Undergraduate Catalog; the Academic Requirements and Policies and the Facilities and Services sections of the Graduate Catalog; and the Student Academic Disciplinary Procedures [UWS Chapter 14]; and the Student Nonacademic Disciplinary Procedures [UWS Chapter 17].)

COVID Related Items

Information for Instructors to Share with Students, Fall 2020

The fall 2020 semester will be different from other semesters because of the COVID 19 pandemic.

General Statements (which can be modified to fit specific courses):

Please visit the UW-Whitewater COVID 19 Website for the most up to date information: https://www.uww.edu/uhcs/covid19. Information on this website is updated regularly. There is information on this site to assist students in their success if they are taking courses remotely.

Students who test positive are strongly encouraged to contact the COVID-19 Hotline at 262-472-1362 (7:30 am to 5:00 pm, Monday through Friday) or covid19info@uww.edu in order to begin contact tracing to potentially exposed individuals.

Students who are ill, should not attend class in person. Students in self-quarantine because of a possible exposure should not attend class in person. Students in these situations will not be required to provide formal documentation from a health care provider and will not be penalized for these absences (their grade will not be affected).

If students will be absent from class they should notify the instructor and let the instructor know how long they expect to be absent (if known). Students should attempt to keep up with classwork if possible and submit assignments on time if well enough to do so. The student should work with the instructor to determine how to take exams, complete labs and other academic activities. Students should stay in contact with the instructors.

Instructors have an obligation to provide reasonable accommodation(s) for completing course requirements to students adversely effected by COVID-19. This obligation relies on honor, honesty, and mutual respect between instructors and students. Students are expected to report the reason for absence truthfully and instructors are expected to trust the word of their students. The UW-Whitewater rules for academic integrity apply to COVID-19 situations. Students may be advised by their instructor or academic advisor to consider a late drop depending on the course as well as timing and severity of illness and students should work with the Dean of Students Office if pursuing a medical withdrawal. Please note that a medical withdrawal is for all courses. A student cannot receive a medical withdrawal for one course. www.uww.edu/dean-of-students

All courses will be fully remote after November 20th through the end of the semester. Instructors have been advised to be prepared to go fully remote earlier than that if required. Students should also be prepared for courses going full remote with little advanced notice.

The State of Wisconsin and UW-Whitewater are requiring all individuals to wear face coverings on campus. **Face coverings are required in classrooms**, which means that eating will not be allowed in classrooms as it requires the removal of facial coverings.

- Please be aware that some individuals may have disabilities that prevent them from wearing a mask or face covering and that these individuals may be working with the University as part of the reasonable accommodation process.
- If you have a health condition or a disability that prevents you from wearing a mask or face covering, you may:
    - Seek an accommodation either through the CSD (Center for Students with Disabilities, https://www.uww.edu/csd) or HR (Human Resources) for employees (including student employees).

Social distancing is also required. The seating in the classroom has been arranged to provide 6 feet of social distancing. Students should take care to socially distance as they enter and leave the classrooms. Congregating in hallways and in lobby areas will not be permitted.

Additional information:

This course is offered in concurrent face-to-face, synchronous Hyflex/hybrid, and synchronous on-line only options. You may change which mode you need or require during the semester.

Students will have their temperature taken with a contactless IR thermometer when entering the classroom. This is not only to check for potential illness, this is a useful Physics experiment related to our course material!

Office Hours will be held via Webex at: https://uww.webex.com/meet/sahyuns

Video Recording of Class Sessions and On-line interaction:

This course sessions will be recorded and posted to the CANVAS site. This is solely to aid students who cannot attend the class at the given time and no portion of the recorded videos may be copied, rebroadcast or otherwise distributed.

FALL 2020 FINAL EXAM SCHEDULE

All instructional staff of on- and off-campus classes are expected to meet during their scheduled final exam period. All comprehensive final exams shall be administered at the prescribed time during the final exam period. For those classes where there is no final exam, the time prescribed during the final exam period shall be used as a regular class meeting. Exception to meeting classes during the exam period requires specific written approval in advance from the college dean.

The general schedule will be available via PDF around the beginning of the given term. Due to the amount of department requested changes, the specific final exam schedule in WINS will not be available to view until after the tenth day of classes for the term.

No student shall be required to take more than two comprehensive final exams on the same day. Any student with more than two comprehensive final exams scheduled on the same day who want to reschedule the excessive exam(s) must make arrangements with the instructors involved. If the student and instructors are unable to reach mutual agreement about alternate arrangements, the student must notify the Chair of Department by October 16. The Chair of the Department shall arrange times as necessary with instructors involved and shall notify the student of the arrangements by November 13. This policy covers only comprehensive final exams given during the final exam period. Common exams cannot be reschedule.

- Final exams for web-based classes are scheduled during finals week at the discretion of the instructor.
- Classes scheduled MW, MWR, MF, or WF are to follow the MWF exam times unless otherwise stated.
- Exams for off-campus evening classes are scheduled for the regular class meeting time that falls during the exam week that begins December 14.
- Classes offered at non-standard class times do not have designated final exam periods. Instructors are to make arrangements to administer exams during the December 18 exam times.

Monday, December 14

7:45-9:45 a.m.	MWF or MW or MTWR classes beginning between 8:00-8:50 a.m.
10:00-12 Noon	MWF or MW or MTWR classes beginning between 10:00-10:50 a.m.
12:15-2:15 p.m.	MWF or MW or MTWR classes beginning between 12:00-12:50 p.m.
2:30-4:30 p.m.	MWF or MW or MTWR classes beginning between 2:00-2:50 p.m.
4:45-6:45 p.m.	M or MW or MTWR classes beginning between 4:00-6:25 p.m.
7:00-9:00 p.m.	M or MW or MTWR classes beginning 6:30 p.m. or later

Tuesday, December 15

7:45-9:45 a.m.	TR or MTR or MTWRF classes beginning between 8:00-8:50 a.m.
10:00-12 Noon	TR or MTR or MTWRF classes beginning between 10:00-10:50 a.m.
12:15-2:15 p.m.	TR or MTR or MTWRF classes beginning between 12:00-12:50 p.m.
2:30-4:30 p.m.	TR or MTR or MTWRF classes beginning between 2:00-2:50 p.m.
4:45-6:45 p.m.	T or TR or MTR or MTWRF classes beginning between 4:00-6:25 p.m.
7:00-9:00 p.m.	T or TR or MTR or MTWRF classes beginning 6:30 p.m. or later and Common Exam 1

Wednesday, December 16

7:45-9:45 a.m.	MWF or MW or MTWR classes beginning between 9:00-9:50 a.m.
10:00-12 Noon	MWF or MW or MTWR classes beginning between 11:00-11:50 a.m.
12:15-2:15 p.m.	MWF or MW or MTWR classes beginning between 1:00-1:50 p.m.
2:30-4:30 p.m.	MWF or MW or MTWR classes beginning between 3:00-3:50 p.m.
4:45-6:45 p.m.	W only classes beginning between 4:00-6:25 p.m.
7:00-9:00 p.m.	W only classes beginning 6:30 or later

Thursday, December 17

7:45-9:45 a.m.	TR or MTR or MTWRF classes beginning between 9:00-9:50 a.m.
10:00-12 Noon	TR or MTR or MTWRF classes beginning between 11:00-11:50 a.m.
12:15-2:15 p.m.	TR or MTR or MTWRF classes beginning between 1:00-1:50 p.m.
2:30-4:30 p.m.	TR or MTR or MTWRF classes beginning between 3:00-3:50 p.m.
4:45-6:45 p.m.	R classes beginning between 4:00-6:25 p.m.
7:00-9:00 p.m.	R classes beginning 6:30 p.m. or later and Common Exam 2

Friday, December 18*

7:45-9:45 a.m.	F only classes beginning between 8:00-9:55 a.m.
10:00-12 Noon	F only classes beginning between 10:00-11:55 a.m.
12:15-2:15 p.m.	F only classes beginning between 12:00-1:55 p.m.
2:30-4:30 p.m.	F only classes beginning between 2:00-3:55 p.m.
4:45-6:45 p.m.	F only classes beginning between 4:00 p.m. or later

*Friday will also include courses offered at a non-standard start time and special makeup exams for on-campus students if authorized by instructor.

Saturday, December 19
Saturday classes should hold exams during the meeting time that falls during exam week.

Sunday, December 20
Sunday classes should hold exams during the meeting time that falls during exam week.

FINAL GRADES DUE IN WINS BY TUESDAY, DECEMBER 22 AT 12:00PM (NOON)